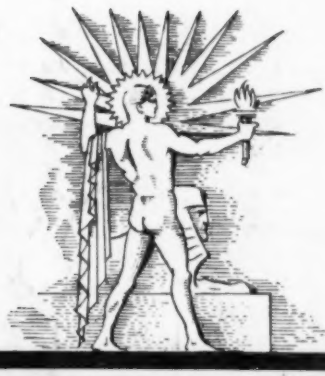
PRICE 15¢

TECHNOLOGY DEPT.

PUBLIC LIBRARY
SEP 22 1941
DETROIT

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



September 20, 1941

River Pest

See Page 182

A SCIENCE SERVICE PUBLICATION

Do You Know?

America's *mountain sheep,* instead of being woolly, have a hairy coat.

Whale milk, wildlife experts say, is not essentially different from cow's milk.

A *rattlesnake* often loses part of its "birth certificate"—the number of rattles that can be counted to show its age.

Odd cases of *allergy* include individuals who can eat rooster meat but have allergic reactions after eating meat of hens.

The original *"carats"* are said to have been seeds of a locust tree so uniform in size that ancient dealers used them to weigh gems.

One wildlife observer says that a *deer* has such power of smell that he can get a man's odor at a full mile if the day is damp and wind favorable.

A piece of dirty pottery from a second-hand store in Los Angeles was recently identified as a *Roman amphora,* or storage jar, of the first century A.D.

On exhibit by the New York Aquarium Society are two tame *toads* that eat cooked vegetables, scraped liver or beef, farina, chocolate, "almost anything."

To speed up *paint jobs* in one American airplane factory, endless conveyor chains carry cylinders and crankcase sections past the painters, who remain at the same station.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

ASTRONOMY

Do "shooting stars" explode? p. 190.

How long is the du Toit-Neujmin comet's tail? p. 184.

Of what are the distant universes made up? p. 190.

BIOLOGY

Where did scientists find a natural growth hormone more powerful than any synthetic chemical? p. 181.

BOTANY

Why should you slash plant stems to make them grow roots? p. 185.

Where can you find a tobacco plant extinct elsewhere for millions of years? p. 185.

CHEMISTRY

For what pest is President Roosevelt interested in finding a good use? p. 182.

What new process makes it possible to manufacture chlorine in unlimited quantities? p. 183.

What new spray will paralyze the jaws of the Japanese beetle? p. 180.

CONSERVATION

How much land is enough for a refuge for Eastern deer? p. 191.

ENGINEERING

What device tells you when your gasoline mixture is too rich? p. 185.

GENERAL SCIENCE

How does a scientist explain man's urge for religion? p. 186.

INVENTION

How can noises in the water pipes be muffled? p. 185.

MATHEMATICS

How is the shortage of trained mathematicians likely to affect the defense program? p. 184.

MEDICINE

What common substance has made the test for influenza virus 1,000 times more delicate? p. 184.

MEDICINE—CHEMISTRY

How can gray hair be prevented? p. 179.

What food would help soldiers to stand a gas attack? p. 180.

What ills are caused by a substance found in blisters from scaldings? p. 179.

What is the true fountain of youth? p. 179.

PHYSICS

With what heavenly happening are auroras linked? p. 187.

PSYCHOLOGY

How can fear act to build up new ways of behavior long after the cause for fright is gone? p. 183.

How do four schools of psychological thought differ logically? p. 180.

How old are America's scientists? p. 183.

What effect on memory is produced by the electric shock treatment for mental disease? p. 182.

PUBLIC HEALTH

What insect is suspected of spreading the horse sleeping sickness? p. 182.

RESOURCES

What precious cargo is being sent from India to U. S. markets? p. 184.

Passages of *Carlsbad Caverns,* New Mexico, thus far explored lead to a level 1,320 feet deep.

Every member of the White House Police is trained and certified in standard and advanced Red Cross *first aid.*

The Department of Agriculture finds that *rats* would rather starve than eat food dosed with meal made from rattlebush beans.

The original *cornerstone* of Philadelphia's Franklin Institute, laid in 1825, has never been found.

According to a study made at a Midwestern state college, 89% of the girls with good feet had good posture.

Star gems, says a Field Museum mineralogist, usually show four- or six-rayed stars as a result of an optical phenomenon known as asterism.

SCIENCE NEWS LETTER

Vol. 40 SEPTEMBER 20, 1941 *No. 12*

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St. N. W., Washington, D. C. Edited by WATSON DAVIS.

Subscriptions—$5.00 a year; two years, $7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

In requesting change of address, please give your old address as well as the new one, at least two weeks before change is to become effective.

Copyright, 1941, by Science Service, Inc. Republication of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Cable address: Scienserve, Washington.

Entered as second class matter at the post-office at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and in the Engineering Index.

Members of the American Association for the Advancement of Science have privilege of subscribing to SCIENCE NEWS LETTER, at $3 a year.

The New York Museum of Science and Industry has elected SCIENCE NEWS LETTER as its official publication to be received by its members.

Advertising rates on application. Member Audit Bureau of Circulation.

SCIENCE SERVICE is the Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: Henry B. Ward, University of Illinois; Edwin G. Conklin, American Philosophical Society; J. McKeen Cattell, Editor, Science. *Nominated by the National Academy of Sciences:* R. A. Millikan, California Institute of Technology; Harlow Shapley, Harvard College Observatory; William H. Howell, Johns Hopkins University. *Nominated by the National Research Council:* Ross G. Harrison, Yale University; C. G. Abbot, Secretary, Smithsonian Institution; Harrison E. Howe, Editor, Industrial and Engineering Chemistry. *Nominated by the Journalistic Profession:* O. W. Riegel, Washington and Lee School of Journalism; A. H. Kirchhofer, Buffalo Evening News; Neil H. Swanson, Baltimore Evening Sun. *Nominated by the E. W. Scripps Estate:* Frank R. Ford, Evansville Press; Warren S. Thompson, Miami University, Oxford, Ohio; Harry L. Smithton, Cincinnati, Ohio.

Officers—Honorary President: William E. Ritter. *President:* Edwin G. Conklin. *Vice-President and Chairman of Executive Committee:* Harlow Shapley. *Treasurer:* O. W. Riegel. *Secretary:* Watson Davis.

Staff—Director: Watson Davis. *Writers:* Frank Thone, Emily C. Davis, Jane Stafford, Marjorie Van de Water, Morton Mott-Smith. *Photography:* Fremont Davis. *Librarian:* Minna Gill. *Business Manager:* Alvin C. Stewart. *Sales and Advertising:* Hallie Jenkins, Austin Winant. Correspondents in principal cities and centers of research.

MEDICINE—CHEMISTRY

Anti-Gray Hair Vitamin Succeeds in Human Subjects

"Cure" of 30 Patients With Para-Aminobenzoic Acid Announced in Report to American Chemical Society

"A MARKED darkening" of previously gray hair and growth of "new natural colored hairs" in 30 human beings has been achieved by small daily doses of one of the newest of the vitamin B group, para-aminobenzoic acid, Dr. Gustav J. Martin, of the Warner Institute for Therapeutic Research, and S. Ansbacher, of the research laboratory of the International Vitamin Corporation, New York City, announced at the meeting of the American Chemical Society at Atlantic City.

This is the first report before a scientific society of the "cure" of gray hair in humans by this vitamin, although there have been a number of reports of the darkening of gray hair in rats and mice with doses of both para-aminobenzoic acid and other B vitamins.

Gray and white headed men and women up to the age of 69 years are growing new, natural colored hair as a result of daily doses of the vitamin, given under the direction of Dr. Benjamin F. Sieve, of Boston City Hospital.

The vitamin has now been given to 300 or more patients with definite successful results, which Dr. Sieve will report later.

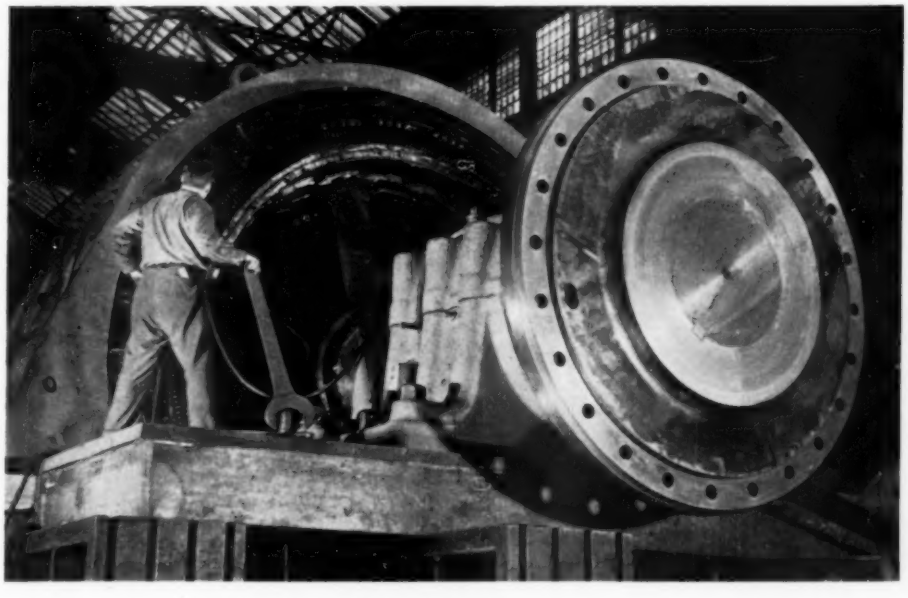
No toxic effects of the vitamin have been found.

Like the other B vitamins, the para-aminobenzoic acid is found in yeast and liver. For the treatment of gray-haired humans the synthetic vitamin, which costs about ten cents a pound, was used. The daily dose is 100 milligrams (about two-hundredths of an ounce), but Dr. Martin warned that it should be taken only under a physician's direction because this chemical has other effects, some of which are only just being discovered. It counteracts the curative effect of the sulfa drugs, for example, and under certain conditions might raise the blood pressure.

More effective treatment for high blood pressure may result from another discovery reported by the same group of investigators with the collaboration of C. T. Ichniowski and W. A. Wisansky, of the Warner Institute. They found that catechol, a chemical related to carbolic acid, greatly enhances the blood pressure-lowering effect of tyrosinase, the enzyme that causes mushrooms and potatoes to darken.

Tyrosinase, previously reported by another scientist as effective in reducing high blood pressures, has the disadvantages of being poisonous and extremely costly in the amounts needed to reduce blood pressure. When catechol is given, the dose of tyrosinase can be reduced to one-thirtieth or less of the amount previously needed to lower blood pressure.

Science News Letter, September 20, 1941



FOR ALUMINUM

This giant 5,000-horsepower electric motor, being tested at the East Pittsburgh works of Westinghouse, is produced for the defense program to help make aluminum for fighting airplanes at the 55-acre plant in Alcoa, Tenn., of the Aluminum Company of America. Note the size of the wrench.

True Fountain of Youth

THE FOUNTAIN of youth consists of fruits, vegetables and milk. This is the twentieth century scientists' answer to the quest of the Spanish explorer, Ponce de Leon in the sixteenth century.

For a long life and a healthy old age, you need to eat at least double the usual amount of these protective foods, it appears from studies of rat diets reported by Prof. Henry C. Sherman, of Columbia University, at the meeting of the American Chemical Society.

The ingredients in fruits, vegetables, milk and butter which contribute especially to a long healthy life are calcium and the vitamins A, C and riboflavin.

A diet enriched with two to four times the amount of calcium usually considered adequate for normal nutrition, Dr. Sherman said, accelerates the rate of development, maintains a higher level of adult vitality with an extended prime of life, and increases life expectation. The extra calcium does not result in hardening of the arteries, he declared, but does strengthen bone structure.

Old people as well as growing children need vitamin A, the latest studies show. This vitamin is found in butter and in yellow and green vegetables. Vitamin A used to be known as the growth vitamin because without it young animals do not grow normally. Adding vitamin A in the form of butter to a diet already considered adequate induced benefits which were particularly pronounced after middle age, Dr. Sherman reported. Female rats on this diet

not only live longer but keep their appearance of prime physical condition and their ability to have offspring to higher ages.

Science News Letter, September 20, 1941

"Shock" Stuff in Blisters

A SUBSTANCE having some of the same physiological effects as histamine was found in the fluid of blisters caused by accidental scaldings in human beings, by Dr. I. J. Greenblatt and A. Pecker of Bellevue Hospital, New York City. Histamine is a compound held responsible for shock, asthma and other disagreeable but baffling effects by some physicians.

When administered to rats, this blister fluid had the same effects on their digestive reactions as histamine. Histaminase, an enzyme that destroys histamine, prevented the reactions in the rats.

Science News Letter, September 20, 1941

Pancreas Aids Vitamin

VITAMIN A, made famous through its use to improve the vision of night-fighting pilots, is not absorbed into the bodies of persons with certain diseases or defects of the pancreas, gland under the stomach important in digestion. Experiments establishing this point and indicating ways of helping such patients were described by Dr. S. W. Clausen of the University of Rochester School of Medicine and Dentistry.

Dogs with their pancreases put out of action showed as poor vitamin A absorption as did parallel human cases. When various preparations of fresh pancreas, obtained from packing houses, were mixed with vitamin A, absorption was greatly improved. After "trying it on the dog," like treatment was used on human patients, with similar beneficial results.

The seriousness of these cases, and the importance of finding a successful treatment, is emphasized by the discovery that they are in danger not only from the lack of vitamin A, but also from a lack of the rickets-preventing vitamin D, the anti-sterility vitamin E, and the hemorrhage-stopping vitamin K.

Associated with Dr. Clausen in his researches were Dr. B. B. Breese, Jr., Dr. A. B. McCoord, Dr. E. B. Mahoney and Dr. C. P. Katsampes.

Science News Letter, September 20, 1941

Meat Offsets Gas Poison

AMERICAN soldiers, with their high meat ration, are physically better equipped to meet certain types of war gas than is Vegetarian Hitler, it appears from a report submitted to the meeting of the American Chemical Society by Dr. Jakob A. Stekol and Dr. William J. Conway of Fordham University.

Meat and some other protein foods contain two compounds known as cystine and methionine. These compounds, fed to rats in the experiments of Drs. Stekol and Conway, were found to detoxify benzene derivatives, used as war gases in 1914-18, and also employed in many industrial operations. The same compounds prevented ill effects from pyridine, a poison present in tobacco smoke, and from naphthalene, another industrial compound most familiar to the public in the form of mothballs.

"Vegetarian Hitler would certainly prove to be no match for beef-eating Churchill if both were given the same dose of pyridine or benzene," the Fordham chemists declared. "If Bernard Shaw's vegetarian diet had occasionally been seasoned with a dash of pyridine, he would not have lived to be 85.

Science News Letter, September 20, 1941

Sprays Disable Beetle

POISON sprays that need only to touch Japanese beetles to disable them were described before the meeting of the American Chemical Society by Dr. W. H. Tisdale and Dr. A. L. Flenner of the du Pont pest control laboratory at Wilmington, Del. Contact with the beetles promptly paralyzes their mouthparts and forelegs. Naturally, a beetle with paralyzed jaws can't be very active as a pest.

There are a number of compounds having this effect, Dr. Tisdale stated. All of them are derived from a complex organic chemical known as dithiocarbamic acid. Some of them have been found effective against other animal pests, among them the internal parasite causing the serious poultry disease, coccidiosis.

The compounds prove their versatility by being deadly also to fungi that cause plant disease. They even do their own sticking, eliminating the need for adhesives added to many other fungicidal sprays to make them cling.

Science News Letter, September 20, 1941

Warning Against "Hate"

WARNING against any repetition of the "hate" resolutions that marred the record of the American Chemical Society during World War I was sounded by Prof. Harrison Hale of the University of Arkansas. Prof. Hale called attention to the action of the Society in 1918, in withdrawing honorary membership from three noted German chemists, Nernst, Ostwald and Fischer.

"The inevitable effort to make amends for this inconsistent error of hasty action came in 1927, when Nernst and Ostwald were restored," Prof. Hale continued. "Fischer died in 1919 but not before he is said to have refused to consider restoration. This bit of history is given that as American chemists we may reaffirm our faith in the internationality of science and seek to protect this belief from any emotional attack that may come either from ourselves or from others."

Science News Letter, September 20, 1941

PSYCHOLOGY

Psychology's Many Schools All Logically Feasible

Each Might Be Developed Without Conflict And All Programs Might Be Successfully Attained

PSYCHOLOGY'S various schools, about which scientists have argued so much, are all feasible, logically, and all might be developed without conflict, Dr. Clark L. Hull, of the Institute of Human Relations, Yale University, told the Sixth International Congress for the Unity of Science, meeting at the University of Chicago.

This Congress was conducted by a group of thinkers informally known as the Vienna Circle, among whose doctrines is one strikingly similar to what is known in America as behaviorism.

Four possible logical approaches to the problem of explaining human behavior were outlined by Dr. Hull:

1. You can accept the concepts of the physical sciences as the primary or undefined notions on which your system rests, and consider such mental states as anger or perception as coming between a physical event such as a rock dropping on your toe and the very easily observed and measured result, a cuss-word. These objectively observable facts would have to be linked, for logical understanding, with the intervening mental states by equations that would express their observed relationships.

2. You could build a system in which all forms of behavior, such as speaking or kicking or even changing temperature, might be logically deduced directly from the concepts of the physical sciences without assuming any intervening mental state. In other words, such a theory would be to the effect that the rock itself, in hitting the toe, produces the outburst of language—it is not necessary to assume that you became angry first. This is behaviorism.

3. You can use, as your initial or undefined notions, subjective concepts such as those found in the reports made by an individual of his strictly private observations of himself. This tends to be the program of the Gestalt school, Dr. Hull said.

4. You can take as the primary notions the goals or aims of behavior, and reason that specific actions are determined by these ends. This is the program of teleology and vitalism with which Prof. Edward C. Tolman and the Gestalters have an affinity.

"Each of these approaches," said Dr. Hull, "represents a program of research. It is conceivable that all four might be succesfully attained. My personal favorite is, of course, the second or behavioristic program."

The first approach, Dr. Hull considers feasible, he said, although it is doubtful whether it is worth bothering about the subjective. The Gestalt approach is a legitimate scientific venture, but "a rather poor gamble." The fourth is inherent in the molar or macroscopic approach into which all behavior theorists at present must be forced. But this handling of behavior in large units has distinct limitations, Dr. Hull said, and should be minimized to the last degree possible.

Science News Letter, September 20, 1941

BIOLOGY

Natural Growth Hormone Found in Ripening Pollen

U. S. Department of Agriculture Scientists Obtained Their Material By Ripening Corn Pollen in Ether

A GROWTH-PROMOTING hormone, more powerful than any of the synthetic chemicals now in use for speeding root formation, inducing growth of seedless fruits and other recently discovered "plant magics," has been found in pollen by two research workers of the U. S. Department of Agriculture, Dr. John W. Mitchell and Miss Muriel Whitehead.

They obtained their material by extracting ripening corn pollen in ether and then evaporating off the ether. A fatty substance is left, which is mixed with lanolin in one-to-ten ratio. This paste or ointment is then spread on the plant part where growth-stimulating effects are desired. A ring of it around the stem of a seedling bean plant caused an elongation between 1.5 and 2.5 times greater than that obtained by treatment of comparison plants with any of the synthetic growth regulators.

It is not unlikely that the pure substance itself, when it has finally been isolated, will have even more powerful effects, for the crude ether extract of pollen is very likely a mixture of several substances, not all of which have growth-stimulating properties.

Chemical analyses of the ether extract will be actively pushed, for if the active principle can be isolated and its chemical structure determined, it may be possible to make it artificially.

The effectiveness of the newly-discovered substance in making plant stems grow longer may be put to practical use by florists in getting longer-stemmed flowers or in producing longer-fibered stems in such textile plants as flax, hemp and ramie. Such large-scale uses will depend, of course, on working out large supplies of the chemical at low cost.

Another use that has been discovered for growth hormones recently has been in producing seedless fruits from unpollinated flowers. A large range of plants, from holly berries to tomatoes, have been thus treated with good results. Spraying orchard trees with the hormones has had the effect of restraining flower buds from opening until danger from late frost is past, of inducing apple and other trees to hang onto their fruit instead of dropping much of it prematurely, and of hastening the ripening of oranges.

To obtain a supply of pollen for their researches, Dr. Mitchell and Miss Whitehead exploit bees bringing the yellow dust back to the hive. The bees are compelled to pass through a narrow, screen-lined pollen trap, which scrapes off their loads of pollen.

Science News Letter, September 20, 1941

CONSERVATION

Transparent plastic as a substitute for suddenly-scarce aluminum in the casings of radiosondes (high-flying robot weather observatories) will release six tons of the white metal for defense purposes on a recent order for 31,200 of the balloon-borne instruments placed by the U. S. Weather Bureau with the Washington Institute of Technology. Laura Young, holding the radiosonde on her lap to show how transparent its casing really is, points to the part of the instrument where those now-famous long blond human hairs are used as the essential driving mechanism of the hygrograph, or humidity indicator.

PUBLIC HEALTH

Infantile Paralysis Definitely on Decline

NATION-WIDE reports to the U. S. Public Health Service show that the infantile paralysis outbreak is apparently definitely on the decline. Total number of cases from all states but Idaho was 586 for the week ending Sept. 6, compared with 624 for the previous week. Idaho reported only one case for the previous week, so the total figure is not expected to be much changed when her report arrives.

A big jump in human cases of horse "sleeping sickness," or equine encephalomyelitis, was reported from North Dakota. For the week ending Sept. 6 this state reported 151 cases, compared with 98 the previous week. The increase, however, may be due to delayed reports, health authorities explain. Minnesota, South Dakota and Colorado reported fewer cases for the week of Sept. 6 than the previous week. From Wisconsin came a report of 24 cases of encephalitis between Aug. 16 and Aug. 30, but no report for the week of Sept. 6.

From Canada Rockefeller Institute investigators at Winnipeg report that the outbreak in Manitoba apparently was caused by the Western strain of equine encephalomyelitis virus.

Unusually warm weather, abundant rainfall and less mosquito control activity this year than in previous years in Manitoba, also reported by the Rockefeller scientists, seem to strengthen the case against the mosquito as the villain that spreads this disease of horses and man.

Science News Letter, September 20, 1941

CHEMISTRY

U. S. Scientists Seek Use for Water Chestnut

See Front Cover

EFFORTS to find means for making water chestnut self-liquidating are being made by the U. S. Department of Agriculture at the instance of President Roosevelt. This floating plant pest, introduced into some eastern rivers years ago, blocks navigation channels and has to be kept cleared out. It is especially bad in the Potomac estuary. The President expressed the hope that some use might be found for it that would repay part of the cost of its removal.

The plant in its fresh state contains about 98% of water. The dried residue consists mainly of cellulose. A quantity of it has been dried and bagged and sent to the Northern Regional Laboratory of the Bureau of Agricultural Chemistry and Engineering at Peoria, Ill., where cellulose research now centers.

In China, the native home of the weed, its sharp-horned fruits are gathered and the meat extracted for food. It is quite tasty, too, as any chow-mein devotee can testify. The trouble is, however, that a great deal of hand labor is involved in this use, which makes it impracticably costly in this country. Mass use of the whole plant, by mechanized means, offers the only possible economic solution under American conditions.

Science News Letter, September 20, 1941

PSYCHOLOGY

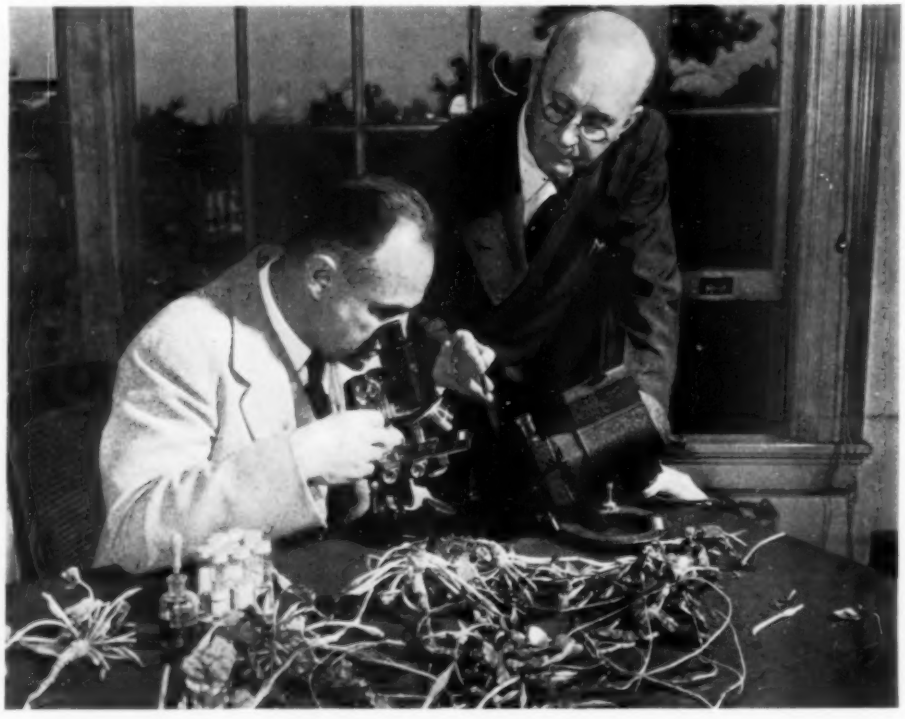
Electric Shock Treatment Causes Partial Memory Loss

Amnesia Greatest for Period Near the Treatment; May Be an Advantage in Preventing Dread of Shock

ELECTRIC shock treatment used to jolt a mental patient out of his dream world back into sanity has been found to cause a partial loss of memory, Dr. Joseph Zubin of the New York State Psychiatric Institute and Hospital, told the American Psychological Association meeting in Evanston, Ill. It was at Dr. Zubin's institution that the electric shock treatment was given for the first time in the United States in June 1940.

After reports that patients who had had the shock treatment found it difficult, following the shock, to remember where they lived or whether they had had the treatment, Dr. Zubin made some careful tests of memory before and after the shocks.

The test was to memorize and later recall a list of groceries such as coffee or sugar together with some invented "brand" names.



HUNTING FOR VALUE

Dr. Henry G. Knight, chief of the Bureau of Agricultural Chemistry and Engineering, is explaining to Secretary of Agriculture Claude R. Wickard the structure of the leaves of the water chestnut which is being tested for possible uses at the request of President Roosevelt.

Memory after a shock is only about 87% what it is without the shock, Dr. Zubin found. The names learned just before the shock were harder for the patients to remember than names learned earlier, although ordinarily the most recently learned names are remembered best.

This loss of memory for happenings close to the time of the shock may be considered as a good thing for the patient, Dr. Zubin said. Patients do not fear or dread the treatment because of this fact that it is not remembered. In other shock treatments, such as the metrazol or insulin therapy, patients sometimes learn to dread the business of preparing for the shock and having the hypodermic needle stuck into them.

Science News Letter, September 20, 1941

Anxiety Outlives Cause

HOW anxiety may be built up in an individual and persist to cause the learning of habits long after the reason for fear is gone was demonstrated in animal experiments reported by Dr. Neal E. Miller, of the Institute of Human Relations, Yale University, before the American Psychological Association.

Rats when first placed in a two-compartment box had no particular preference for either the black or the white compartment. But a shock in the white box would make them scurry into the black box through the open door between them. After a few repetitions of this, they would escape out of the white chamber even when there was no shock. They would even learn, with no more shock, to do a lot of work, turning a wheel or pushing a bar to get the door open and get out of that white box.

This, Dr. Miller said, is like the way human patients will persist in peculiar compulsive behavior and in learning new habits that seem to have no sense, to escape from anxiety the cause for which is gone.

Hungry animals who learned to run into the black chamber for food would later learn to operate the wheel to open the door even though they had had before that all the food they could eat.

Science News Letter, September 20, 1941

Scientists Are Young

AMERICAN scientists are young. This has been revealed by the listing for defense of all American scientists in the National Roster of Scientific and Specialized Personnel, Dr. Leonard Carmichael, president of Tufts College and director of the Roster, told psychologists at the American Psychological Association meeting.

Over a fourth of the first 60,000 scientists listed on the roster are under thirty years old. More than half are under forty. Only a fifth are over fifty. The total on the Roster now is more than 180,000.

The roster is the reservoir of scientific brains for all the defense program and is similar to the National Register through which the British keep in touch with their scientists. All sorts of information about the scientists, their training, experience, location and what they are now doing is instantly available in the form of 80-column punched cards which can be sorted and counted in a matter of minutes by electrical machines.

In the last few months, the Roster has been used to supply to defense agencies more than 40,000 names.

Science News Letter, September 20, 1941

CHEMISTRY

Chlorine Can Now Be Made In Unlimited Quantities

New Process Reported to American Chemical Society Does Not Require the Use of Any Electric Current

CHLORINE, poisonous green gas needed in immense quantities in both defense and civil industries, is now available on an unlimited basis, through a new process reported to the American Chemical Society in Atlantic City by its discoverers, Prof. Arthur W. Hixson and Dr. Alvan H. Tenney of Columbia University.

Best feature of the new process is that it does not require the use of any electric current, needed in the production process now most widely in vogue. Need for electricity in other vital defense activities, notably aluminum manufacture, was in danger of creating a serious bottleneck in chlorine output.

The only raw materials needed are sulfur and common salt, both of which can be produced in this country by millions of tons. The sulfur is burned in air, producing dry sulfur trioxide. This gas is thoroughly infiltrated through salt. The material thus made, when heated, gives off chlorine gas, while the solid part remains behind as salt cake, or sodium sulfate, another chemical used in the manufacture of glass, rayon, paper and in many other industries.

The process is self-contained so far as energy requirement is concerned, for the heat produced by the burning sulfur is more than enough for the second step, where the chlorine is separated from the salt cake.

Uses of chlorine in industry are legion, and demand from defense-speeded plants is going up by leaps, Prof. Hixson reported. He said:

"In 1940, when chlorine production was close to capacity, 605,000 tons were consumed in the United States, an increase of 120,000 tons over 1939. This year the demand is twice as great, and by 1942 it probably will double again.

"New uses for chlorine are found almost daily. Neoprene, principal ingredient of synthetic rubber, contains chlorine. Ethylene glycol, used to cool the Army's latest high-speed airplanes, requires the chemical for its manufacture, as does ammonium picrate, the Navy's main source of explosives. Chlorine is also used to make the lucite windows of modern long-range bombers, and in the salt-waterproof plastic insulations of anti-magnetic cables which have recently been designed to combat the menace of magnetic mines.

"Huge amounts of chlorine may be needed at any time to purify emergency supplies of water for armies in the field, as it now purifies the nation's water supplies. Chlorine compounds have uses varying from cleaning women's dresses to scouring the sides of battleships before painting; from manufacturing health restoring medicinals to preparing the latest types of war gases."

Science News Letter, September 20, 1941

● RADIO

Thursday, September 25, 2:45 p.m., EST

On "Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. A. C. Ivy, of Northwestern University, will discuss life at high altitudes and aviation medicine.

Listen in each Thursday.

MEDICINE

Collodion Used in Test For Influenza Virus

COLLODION, familiar to most people as a sort of liquid courtplaster, may some day help your doctor determine which kind of influenza you have or help in swifter diagnosis of other ailments caused by viruses. Collodion particles can be used for identification and typing of influenza virus in throat washings, Dr. Kenneth Goodner, of the Rockefeller Foundation's International Health Division Laboratories, announces. (*Science,* Sept. 5.)

The study of viruses and diseases caused by them, such as infantile paralysis and yellow fever, are handicapped at present, Dr. Goodner points out, by lack of test tube reactions which can detect very small amounts of the virus. This difficulty is overcome by the collodion fixation method he has developed which magnifies the reaction used for identification of viruses, making it 1,000 times more delicate than any heretofore described reaction of this type.

Science News Letter, September 20, 1941

MATHEMATICS

Mathematicians Concerned Over Shortage of Men

GREAT concern was expressed among members of the American Mathematical Society, meeting at the University of Chicago, about the shortage of manpower in the field of mathematics, the "handmaiden" of all the sciences.

The lack of men qualified to teach mathematics seems likely to hinder defense training programs in the near future.

"Reports coming in from heads of various university mathematics departments indicate," Prof. Marston Morse, president of the society, said "that at the present time there is a serious shortage of properly qualified instructors in mathematics at the university level."

If, in the face of this shortage, mathematicians should be shifted by the emergency from what they are doing to jobs that do not use their talents, it would have a bad effect on morale, members of the society seem to feel.

"There is a very close relation between the morale of the young scientists in the country and the proper use of their special abilities in connection with defense," Prof. Morse said.

Reports from industry and from various technical services in the government indicate a marked shortage of mathematicians who can also qualify in engineering fields.

The head of a western university mathematics department is likely to lose one of his regular instructors in the selective service and he reports he would not know how to replace him with a suitable man now that the college year has started.

"If I had to replace a member of my staff, I would not know where to turn for a first class man," said the head of another mathematics department.

The head of another department in a state university with an engineering school said he needs four new men and is finding difficulty in locating them.

Science News Letter, September 20, 1941

RESOURCES

India Sends More Jewels, Hopes to Keep Our Trade

INDIA is sending increasing quantities of rubies, sapphires and other jewels straight to the United States, as fortunes of war play havoc with gem markets of the world.

Trade in precious stones and pearls has shifted tremendously in India, says the U. S. Bureau of Mines. The London gem market partly closed in 1940; the Paris market folded. Turning to the United States, Indian jewel exporters have been building up a direct trade which has not thus far entirely offset the loss of Paris and London, but which India hopes to keep when war ends.

Nearly half a million dollars' worth of precious stones and pearls reached the United States from this source last year, in mounting quantity. Rubies are the chief item, far outranking in value the shipments of sapphires, emeralds, diamonds, or pearls. In 1939, the United States bought less than $2,000 of India's rubies; in 1940 it took $182,000.

Bombay's famous pearl markets are reported to be mere shadows of their one-time activity. Demand in pearls now comes chiefly from Indian princes and persons of wealth who want gems of unusual size and luster.

Attempts at growing pearl oysters in captivity have met with success at a farm started by the Madras Department of Fisheries. But India expects no sizable pearl industry of this sort, at least, for years to come.

Science News Letter, September 20, 1941

IN SCIENCE

ASTRONOMY

New du Toit-Neujmin Possesses Short Tail

A TAIL equal in length to one-tenth the diameter of the moon has been observed on the du Toit-Neujmin comet by Dr. George Van Biesbroeck at the University of Chicago's Yerkes Observatory, and reported to the Harvard Observatory, clearing house for astronomical observations in this part of the world.

Dr. Van Biesbroeck reports also a central condensation and states that the comet is now of the 11th magnitude. If previous reports of the 8th magnitude are true, the comet has become fainter and is receding. The orbit is believed to be elliplical. Only objects of at least the 6th magnitude (magnitude refers to brightness with "first" meaning brightest) can be seen with the naked eye. Hence it is likely that this celestial visitor will remain unseen by any but astronomers at their telescopes.

The comet was discovered independently by the two astronomers whose names it bears, one in South Africa and the other in the U. S. S. R. (*See SNL,* Sept. 6.)

Science News Letter, September 20, 1941

ENTOMOLOGY

Bees Defend Food Source As Well As Their Hive

BEES, long known as stout defenders of their home hives, have now been shown willing to fight also for the places where they collect their food. Experiments demonstrating this point are reported by Dr. H. Kalmus, formerly of the Prague Technical College and now of University College, London. (*Nature,* Aug. 23.)

Dr. Kalmus poured sugar syrup on sand in shallow glass dishes, and placed them where marked bees of a certain species could get at them. They were soon earnestly at work, digging among the sand grains to get the sweets. When stranger bees of another species appeared, the first-comers attacked viciously and drove the would-be raiders away.

Science News Letter, September 20, 1941

NCE FIELDS

BOTANY

Lacerated Stems Strike Roots More Quickly

IF YOU want good rooting from your plant cuttings, abuse them. That would seem to be the conclusion to be derived from experiments with wounded cuttings performed by Prof. Carl D. LaRue of the University of Michigan. (*Proceedings of the National Academy of Sciences,* August.)

Prof. LaRue used leaves and shoots from coleus and other plants. On one set he slashed the cut ends of the stems almost to a pulp, with a razor blade. A second similar set he left with stems clean-cut but otherwise unwounded, as controls.

After keeping both sets in a moist chamber for 48 hours, he removed the lacerated ends from the unwounded ones, then set them all out to strike root. The stems that had been wounded uniformly produced more roots than did the clean-cut control stems.

Prof. LaRue made a second test, this time making an extract from plant wound tissue and treating the ends of plant cuttings. He found that this wound extract had a stimulating effect in the production of new roots.

Science News Letter, September 20, 1941

BOTANY

Million-Year-Old Tobacco In California Garden

A TOBACCO plant that grows to tree size has been brought back from prehistoric eras and is now growing in botanical gardens of the University of California.

Discovered on the romantic Juan Fernandez Islands off the South American Chilean coast, the strange tobacco survives, with other exotic plants, after its kind has been extinct elsewhere in the world for millions of years. Cut off from the South American continent by some ancient geologic catastrophe, many life forms were sheltered on the islands from climatic changes and alien enemies that gradually destroyed their species on the mainland, and today are a living museum of ancient life for scientists to explore. There are rare palms, tree ferns, giant, tree-like sunflowers and other botanical marvels that grew when the world was young. It is like stepping back millions of years to explore Juan Fernandez.

A collector working under Dr. T. Harper Goodspeed, professor of botany and director of the University of California's botanical garden, found the rare tobacco growing on one small island, Mas Afuera. To reach the plants he had to use rope ladders and scale rocky cliffs on the volcanic island. Seeds from these plants, called *Nicotiana cordifolia,* sent to Dr. Goodspeed last year and planted in the Berkeley gardens are now six feet high, and have large, velvety-white, rather heart-shaped leaves. They will bloom soon, with clusters of inch-long, reddish violet, tubular flowers.

These Pacific islands became famous when the writer, Daniel Defoe, chose one of them as the setting for his best known book, "Robinson Crusoe." Since then, they have been popularly known as the "Robinson Crusoe Islands."

Dr. Goodspeed expects to experiment with the ancient tree-tobacco, perhaps improving it for commercial use, or developing a superior hybrid by cross-breeding with a nicotiana native to the Chilean mainland.

Science News Letter, September 20, 1941

INVENTION

Luminous Dials For Portable Galvanometers

LUMINOUS dials, common in watches and clocks, are now used on portable galvanometers, for testing electrical circuits. When one has to be used in a dark place, underground in a mine, for example, the readings can be taken quickly, without requiring the use of one hand to hold a light at a convenient angle. (*Atlas Powder Co.*)

Science News Letter, September 20, 1941

MEDICINE

Desk-Size Device Will Record Brain Waves

ELECTRIC waves originating in the brain were detected a few years ago with a battery of equipment that resembled the transmitter of a broadcasting station. But now a portable "encephalograph," as the equipment is called, has been developed for the use of the physician in diagnosis. It is small enough to be placed on the doctor's desk. (*Electro-Medical Lab., Inc.*)

Science News Letter, September 20, 1941

ENGINEERING

Portable Device Measures Richness of Gas Mixture

CONSERVATION of gasoline is aided with this portable device. It quickly analyzes the exhaust of a motor to determine accurately the composition of the mixture of fuel and air supplied to the carburetor. It tells whether the mixture is too rich, a condition which does not result in great loss of power, though it wastes precious fuel. (*Cambridge Instrument Co.*)

Science News Letter, September 20, 1941

INVENTION

Diamond-Studded Tool Grinds Spectacle Lenses

A GRINDING tool impregnated with crushed diamonds and two new automatic machines will speed up the production of spectacle lenses and do the work more accurately. The machines are the invention of Lloyd Goddu, research engineer of the American Optical Company, Southbridge, Mass.

One machine picks up the lens blank with four metal fingers and mounts it on a block on which pitch has previously been poured in the exact amount required from an electrically heated pitch pot.

The blocked lens is then transferred to the other machine. Here the single diamond-studded tool grinds it to the exact curves called for by the prescription, an operation that previously required 240 different grinding tools, one for each curve, various loose abrasives, some hand work, and much lens measuring.

The grinding machine is completely automatic. Numbered dials are set according to the prescription, the machine is started and when the work is finished the machine stops.

Science News Letter, September 20, 1941

INVENTION

Noises in Water Pipes Muffled By Silencer

DISAGREEABLE noises in water pipes can be muffled by a new fluid silencer recently patented. It is inserted in the pipe line in the same way that an automobile muffler is, but since it deals with a liquid instead of a gas, the principles of its operation are quite different. (*Roland B. Bourne, West Hartford, Conn. Patent No. 2,233,804.*)

Science News Letter, September 20, 1941

GENERAL SCIENCE

Religion and Being Good Not Necessarily Connected

Theory Advanced That Religion Is Culmination Of Tendency of Organism To React to Whole Situation

A SCIENTIFIC view that there is no necessary connection between religion and whether a person is good or evil was boldly presented to the second annual Conference on Science, Philosophy and Religion meeting at Columbia University by Dr. Hudson Hoagland, Clark University physiologist.

Stating as a fact that "many, if not most, scientists are agnostics," Dr. Hoagland challenged religionists and some philosophers with the idea that the agnosticism of the scientists is as deeply ingrained as is the religious faith of other people.

Good and evil, Dr. Hoagland contended, refer to that which is good and bad for a particular organism at a particular time.

"Thus ethics may be something quite independent of religion," he said, "although when sound ethics can be combined with the basic religious drive, as has often happened, desirable social conditions are likely to follow. On the other hand, when bad ethics become combined with a religious drive such as that behind Nazism, bad social conditions will follow.

"Scientists in general believe strongly in certain ethical activities and in ideals controlling them. Empirically there is such a thing as the good life, and one need not justify it by supernatural sanctions. The lives of such men as Socrates, Christ, and Lincoln, in contrast to Nero, Napoleon, and Hitler speak for themselves. Most agnostic scientists are as ready to fight for their ideals as they would be if they believed them to be sanctioned by God—or by science for that matter."

Dr. Hoagland explained that all that we know is a product of the functioning of our nervous systems and that our neurosensory apparatus is itself a direct product of biological evolution. One of the most fundamental characteristics of a biologically successful organism is that it reacts to situations as a whole.

"Religion appears to me," said Dr. Hoagland, "to be a culmination of this basic tendency of organisms to react in a configurational way to situations. We must resolve conflicts and disturbing puzzles by choosing some sort of configuration, and the religious urge appears to be a primitive tendency, possessing biological survival value, to unify our environment so that we can cope with it. This same basic urge is perhaps the source of esthetic pleasure in art and in science. Since art forms and scientific theories are limited in their scope, more extensive satisfaction is derived from religious interpretations of the meaning of life. These are especially satisfying if they can unify cosmology and views about values in one theology.

"The same motivation is the mainspring of many social philosophies which give a basis for extrapersonal unity of belief and action. For this reason the totalitarian faiths of the Nazis, Fascists and Communists appear to stem from the same basic biological source as does the faith of the devoutly religious man. The very name, totalitarian state, is suggestive of this."

Dr. Hoagland's paper, which resulted from group discussions in New England, was among those discussed at the opening sessions of the five-day conference devoted to the relation of science, philosophy and religion to the democratic way of life.

Religious people and agnostic scientists alike, Dr. Hoagland emphasized, can and should stand together in opposition to totalitarian threat that stresses the all-importance of the state and degrades the individual to insignificance. He urged the conference to promote a world federation too strong to be attacked and capable of popular self-government after the manner of our own federal government.

Science News Letter, September 20, 1941

REPAIRING SABOTAGE

After the Italian cargo vessel S. S. Villaperosa was sabotaged by the smashing of the bedplate of the engine into literally thousands of pieces, the job of putting this nautical humpty-dumpty together again was accomplished by electric arc welding. This photograph was made by the manufacturers of the welding equipment, the Lincoln Electric Company.

Set Directions, Not Ends

DON'T WORK toward set ends, but instead strive in a desired direction, Dr. Margaret Mead, anthropologist of the American Museum of Natural History, advised the conference as a result of her studies of primitive peoples.

"A clear picture of the end—a blue print of the future, of the absolutely desirable way of life—has always been accompanied by the ruthless manipulation of human beings in order to fit them, by the use of rack, torture, concentration camp if (*Turn to page* 191)

PHYSICS

Lights of the Arctic Sky

Weird Colored Flames Linked With Sunspot Maxima And Magnetic Disturbances Are Puzzle To Scientists

WEIRD green, yellow, red and purple lights flame in the northern heavens.

They are, say the Eskimo, the dancing souls of the dead.

Only within the past two generations have geophysicists provided a more logical explanation of the aurora borealis, due in part to researches of collaborators of the Carnegie Institution of Washington. Much still remains unknown. Unlike the light of sun, moon or stars, the luminescence of the top and bottom of the world seems to have no substantial source in a hot or reflecting solid body.

Streams of electrically charged particles, possibly electrons and protons, are shot from the flaming surface of the sun. Their velocity is a little less than that of light. These particles are pulled towards the north and south magnetic poles of the earth. They strike the extremely tenuous outer atmosphere extending—this is one of the findings of aurora borealis studies—as much as 800 miles from the surface of the planet.

They collide with atmospheric atoms and molecules, stripping off outer electrons and causing light-producing energy states. The elements present are chiefly nitrogen and oxygen, and the light produced is such as can be duplicated in the laboratory by putting atoms of these elements in the proper conditions of excitation.

Precise Nature Unknown

The precise nature of the particles shot from the sun—there is no other possible source — remains to be determined. Wherever they collide with atmospheric atoms they produce luminescence, but, recent investigations have shown, it is only within 50 or 80 miles of the earth that this usually becomes sufficient to produce the sublime spectacle of the aurora.

The height of the light source can be measured, just as can that of any nearby heavenly body, by photographing the phenomenon against a background of stars. This has been done by Störmer and also by the Norwegian geophysicist and Carnegie collaborator Vegard, and the distance of the aurora above the earth has been found surprisingly small.

From the first observations recorded by literate men, the sublime display of the northern lights has stirred practical observers to lyrical ecstasies, and the scientific explanation detracts little from the enthusiasm.

One of the best descriptions is quoted from a Norse manuscript of the year 1250:

Flame of Strong Fire

"It appears like a flame of strong fire seen from afar. Pointed shafts of unequal and very variable size dart upwards into the air, so that now the one and now the other is the higher, and the light is floating like a shining blaze. So long as these rays are highest and brightest, this sparkling fire gives so much light that, out of doors, one can find one's way about and even hunt. In houses with windows it is light enough for men to see each other's faces.

"But this light is so variable that it sometimes seems to grow obscure, as if a dark smoke or thick fog is breathed on it, and soon the light seems to be stifled in this smoke. As night ends and dawn approaches the light begins to pale, and disappears when day breaks. Some people maintain that this light is a reflection of the fire which surrounds the seas of the north and south. Others say it is the reflection of the sun when it is below the horizon. For my part I think it is produced by the ice which radiates at night the light which it has absorbed by day."

The aurora appears in several characteristic forms. Sometimes it is in the form of arcs or bands of vari-colored light stretching across the sky. Sometimes there is the appearance of red or violet clouds scattered over the heavens. A form often noted is a white or greenish glow near the horizon, which looks like the first glimmer of dawn. The "drapery aurora" is described by explorers. The northern sky seems to be hung with luminescent curtains. Most spectacular is the so-called "flaming aurora." Strong waves of red or purplish light move rapidly upwards, one after another, in the direction of the magnetic zenith. It looks like a rolling tide of fire.

The dominant color of the aurora most frequently is yellowish green.

This color is due to a single wavelength of light—the mysterious green line which puzzled physicists for a generation until, in 1925, Sir John McLennan of the University of Toronto was able to reproduce it in the laboratory. It is given off by atomic oxygen in a peculiar state of excitation. The green line appears only when there are mixed with the oxygen some of the other gases found normally in the atmosphere—argon, neon, helium or, most important of all, nitrogen.

The significance of this green line is due not alone to its presence in the aurora. It is also the most conspicuous light-line found in the luminescence of the night sky which is present all over the earth and is sometimes called the "non-polar aurora." On a clear night the sky light, exclusive of the moon, is approximately equivalent to that of a 25-candle-power lamp about 300 meters away. Only about a fourth of this is due to the stars. The rest comes from the high atmosphere. From six to ten per cent of the total is due to the green oxygen line alone.

Nitrogen Chief Contributor

Oxygen bombarded by the corpuscles from the sun also contributes a little of the red light found in auroras. Most of the luminescence, however, comes from ionized nitrogen atoms, especially the blue and purplish shades often reported by observers. Nitrogen remains the chief constituent of the earth's atmosphere, at great heights as well as near the surface.

Actually the northern lights seldom are seen south of the southern boundary of Canada. They can be observed on every clear night within an irregular ellipse around the north magnetic pole, and usually a few hundred miles to the southward. Occasionally they are reported as far south as the latitude of Washington and even—the observations are somewhat questionable — at the equator.

Their southward extension comes at the time of great magnetic storms. The relation between the two phenomena is of exceptional interest to students of terrestrial magnetism and constitutes a tool by which magnetic storms can be studied. Such storms, it now is recognized, come with the maximum number of spots—supposedly titanic whirlwinds—in the fiery atmosphere of the sun. The number of sunspots increases and decreases in approximately an eleven-year cycle. One maximum has just passed and it is probable that another decade will pass before the aurora borealis is seen far to the southward of its normal limits.

Nature Not Clear

The exact nature of the relationship is still unknown. Presumably during a sunspot maximum the surface of the solar body is in an unusually excited state. Larger and more frequent streams of corpuscles than ordinary are shot out into space and hence a greater effect is produced on the outer atmosphere of the earth. The electrical state of the air is altered and there are produced both the luminescence and the magnetic phenomena.

All sorts of weird cycles have been linked up with the progress of sunspots from minima to maxima and back again—from the recurrence of wars to the state of the stock markets. Few of these can be definitely proved, or disproved. The northern lights and the magnetic storm cycles are exceptions of which there can be no question.

At least 50 miles away and usually diffuse and variable, the northern lights are difficult to study. At first sight they may seem extremely bright, but the absolute intensity of the light never is great. Strong aurora may on very rare occasions give enough light to read by, but the total illumination seldom is as great as that of the full moon. Usually on a clear night bright stars can be seen through the curtain of luminescence. There have been reports of auroras in full sunshine. These cannot be verified and seem quite improbable. The color effects of sunlight falling on cirrus clouds might easily be mistaken for the northern lights.

May Last All Night

The duration of the aurora differs from night to night. Sometimes it lasts only a few minutes. It may continue all night and the light appear strongest just before dawn. The phenomenon always has been difficult to photograph because of the absolute dimness of the light. The first successful pictures were taken in Lapland in 1892 with exposures of seven or more seconds. Recently natural color photographs have been obtained.

The spectrum of the northern lights, reproduced and studied under laboratory conditions, sheds some light on the temperature of the earth's atmosphere at great heights. If the air were as dense as at sea level, of course, it would be very hot, but actually it is somewhere between —30° and —40° centigrade.

Hardly a fair start has been made on the scientific study of the northern lights. They are of absorbing interest in at least three fields.

The high atmosphere of the earth, far above the stratosphere which is the limit of airplane exploration, remains a region of mystery. The aurora is one of the few observable phenomena—and by far the most striking—which take place there. If the aurora were thoroughly understood, much light would be thrown on its physical surroundings.

The relation between the strength of the luminescence and the magnetic field of the earth already has been mentioned. Is this a coincidence? It is generally agreed that there is a physical association. When the nature of this is cleared up there will be a better understanding of magnetic phenomena in general.

Studies of the aurora already have given a better understanding of the physical composition of the high atmosphere. They may be expected in the future to prove even more revealing.

The sun is approximately 90,000,000 miles away from the earth. Upon its light and heat all life on this planet depends. But between events on the sun and on the earth there is little observable relation. The northern lights, however, respond specifically to specific changes on the sun's surface and may prove of inestimable value in interpreting these changes.

Does Aurora Sing?

A common belief regarding the aurora is that it "sings." Many observers, including some scientists, claim to have heard strange, semi-musical sounds which increase and diminish in intensity with the northern lights themselves.

The nature of these sounds, if they actually can be demonstrated as real, remains an unsolved mystery of the Far North. That they are due to the aurora, per se, seems impossible.

Occasionally odors—probably the pungent smell of ozone from an electrical discharge—also have been reported as accompanying auroral displays.

AURORA

This photograph taken in Norway shows how spectacular the Northern Lights are at that latitude.

Electricity Showed Industry

HOW TO CLEAN AIR

Dirt has cost American business and industry millions of dollars annually.

But dirt is more than just a nuisance that has to be cleaned up. In many industries dirt can delay production by accumulating in power equipment. It can hamper the production of delicate instruments where clean air is vital to precision and accuracy. These delays would be serious today, but industry has found a way to avoid them.

Two years ago Westinghouse introduced the *Precipitron,* the first electric air cleaner. Installed in a ventilating duct, it electrostatically removes 90 per cent of the dust, dirt and soot, including particles as small as 1/250,000 of an inch. It has no moving parts. Its operation is silent and simple. Particles in the air are electrically charged as they enter the collecting cell. An oppositely charged plate then draws them out of the air. Only clean air passes through the *Precipitron.*

Today the *Precipitron* is serving scores of industries of all types. You will find it clearing the air for manufacturers of precision aviation instruments, in steel mill motor rooms, in power plants, textile mills, as well as in stores, shops and buildings. The Westinghouse *Precipitron* is doing an important job in helping to keep the wheels of business and industry dirt-free and running smoothly.

In many other ways, too, Westinghouse equipment is helping to solve today's rush production problems. Westinghouse engineers are constantly serving industry in the intelligent application of this apparatus. Their services are free for the asking. Just call our nearest local office.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania.

Westinghouse

Time-Saver For American Industry

ELECTRICAL POWER SPEEDS PRODUCTION

No American manufacturer can afford to overlook the modern methods and equipment offered by the electrical industry for speeding up production.

Recent Westinghouse developments include: a new furnace that clean-hardens motor parts without decarburization; a new drive that gives adjustable speed from a-c power; a new portable a-c welder for general utility work; a new transformer of smaller size and lighter weight. These and hundreds of other Westinghouse devices are available to help you facilitate production.

J-94450

ASTRONOMY

All Outside Universes Are Composed of Stars

New Investigation Rules Out Possibility That Elliptical Nebulae Are Composed Only of Dust

EVIDENCE that all the millions of nebulae observed in the far-flung regions of space are composed of stars was presented before the meeting of the American Astronomical Society in Williams Bay, Wis.

Dr. Lyman Spitzer, Jr., of Yale University, stated that failure to resolve the so-called elliptical nebulae into stars had led to the suggestion that they are composed of dust and not of stars at all. However, his recent investigation rules out this possibility, Dr. Spitzer said, and makes it fairly certain that the ellipticals, like their better-known relatives, the spirals, are composed almost entirely of stars.

Nebulae are diffuse patches of light seen in the sky. Some of these are clouds of gas and dust situated within our own Milky Way galaxy, whereas others are at tremendous distances (the nearest is 680,000 light-years away) and are considered to be other systems similar to the Milky Way as a whole.

These exterior galaxies are mostly classified into two main groups—the ellipticals and the spirals. The former range in shape from globular to elliptical, and appear highly concentrated, showing no resolution into stars. On the other hand, the spirals appear as flattened disks, and have often been called the "pinwheels of space." Many spirals have been resolved into stars, but the ellipticals, whether globular or flattened, cannot be separated into stars with our present telescopes.

"An evaluation of the rate of energy dissipation for atoms and for dust shows that interstellar particles of low density require only 40 million years at most to lose any great initial energy, and to come to equilibrium, with velocities less than 12 miles a second," Dr. Spitzer said. "Any interstellar matter in a globular galaxy must be almost entirely concentrated to the center or, in the case of elliptical systems, to the equatorial plane. The total mass of such matter in a globular system cannot exceed 1/500 of its total mass, although no such limit exists for elliptical systems. In any case, the amount of dust or atoms throughout most of an elliptical or globular galaxy must be quite negligible, and the visible light from a galaxy of this sort must be largely direct starlight, not diffuse or scattered light."

Many photographs of exterior galaxies seen edgewise show the presence of dark matter in their equatorial planes. This is possible, according to Dr. Spitzer's theoretical investigations. The stars in such systems form an extended envelope around the assumed highly flattened disk of dark, dense matter.

Science News Letter, September 20, 1941

HARVEY
Pocket Observatory
TRADE MARK REG. U. S. PAT. OFF. U. S. PATENT No. 2,231,071
John A Millar Laboratory Associates, Inc.
22 PLANE STREET, NEWARK, NEW JERSEY

The construction of this instrument insures rapid and convenient operation. Both experienced and amateur astronomers will find innumerable uses for it, and it is an important adjunct to any telescope.

Meteors Don't Explode

"SHOOTING STARS" that flash in the night and burst in the air do not explode like an artillery shell, but instead seem to fly apart due to atmospheric pressure when they plunge toward earth.

Dr. Fred L. Whipple, of Harvard Observatory, reported before the American Astronomical Society, on his studies of the trails of 28 meteors which broke apart or burst in the air while shining brightly enough to be photographed. These trails are included in the Harvard collection of over a thousand meteor trails taken during the last few years.

Although an internal explosion due to external heating and expansion may break the original meteoroid as it passes into the atmosphere, Dr. Whipple believes the evidence of these trails shows that atmospheric pressure on the irregular surfaces of the broken fragments produces the observed changes in their direction. However, the process of splitting should result in deformations that would soon be smoothed by melting and vaporization by friction with the air.

There are photographs of two trails in which three successive divisions occurred as the meteor broke into more and more pieces, and one in which a double or multiple division can be detected. In another case the brighter component and the fainter one deviate together in the same direction, and the brighter (presumably the heavier) deviates more than the fainter. This would be explained on the basis of atmospheric pressure acting for a fraction of a second on irregular surfaces of the fragments.

Dr. Whipple said that "one meteor divided at a height of 48 miles, and two others at about 35 miles each. The splitting usually occurs at maximum light, or about two-thirds of the distance along the meteor trail. Both slow and fast meteors are represented by the split trails, and at least three are members of meteor showers. Split trails do not appear unusual except for their duplicity, and do not seem to represent a distinct class of meteors."

Science News Letter, September 20, 1941

About 2,000 tons of *synthetic rubber* were produced in this country during 1939; and around 11,000 tons were made in 1940.

BOOKS

SCIENCE NEWS LETTER will obtain for you any American book or magazine in print. Send check or money order to cover regular retail price and we will pay postage in the United States. If price is unknown, send $5 and the change will be returned. When publications are free, send 10c for handling. Address:

Book Department
SCIENCE NEWS LETTER
1719 N St., N. W.
Washington, D. C.

CONSERVATION

NATURE RAMBLINGS

by Frank Thone

Questions of Size

WILDLIFE administrators are learning new lessons all the time from experience with game refuges, J. Clark Salyer II, chief of the division of wildlife refuges, U. S. Fish and Wildlife Service, told the International Association of Game, Fish and Conservation Commissioners at their St. Louis meeting.

Since a primary consideration in establishing game refuges is to permit a certain overflow into adjacent hunting lands, size is an important factor, Mr. Salyer stated. There was a tendency in early days of refuge establishment, especially in the richer, more humid parts of the country, to make them too large. The idea now is to make them of more moderate size and have more of them.

Size of course has to be considered in connection with other factors. For small upland game birds in the East, a mere 40 acres will often be sufficient, and a square mile may be enough for adequate protection and feeding of a herd of Eastern deer. But for the scattering bands of desert mountain sheep in the arid Far West, a million acres may not be excessive.

"The size of a waterfowl nesting refuge," Mr. Salyer continued, "can be almost unlimited, so great is the need for greater production. It is conditioned upon the availability of low-grade land for restoration, a satisfactory water supply, and the ability of the administering agency to develop and maintain it.

"It is not sufficient merely to obtain adequate open water and marsh land to produce food and shelter for the waterfowl residents, but for nesting purposes it is imperative to obtain the upland for almost a mile in width adjacent to the water areas in order to give adequate nesting area.

"It is standard practice in the national waterfowl refuge program to obtain a zone averaging a mile in width around the major water areas for this purpose alone. Even then, the number of nests plowed under on adjacent farms is appalling."

Science News Letter, September 20, 1941

From Page 186

necessary, to the decreed pattern," Dr. Mead warned. "When such attempts have been merely the blind intuitive gropings of the fanatical and the power-driven, they have been sufficient to destroy all the values upon which the democratic way of life is based. Implemented by science—as they could be implemented—a new hideousness is created unguessed at in the darkest torture chambers of the past. The victims of such a process become progressively more apathetic, passive and lacking in spontaneity; the leaders become progressively more paranoid. Only by devoting ourselves to a direction, not a fixed goal, to a process not a static system, to the development of human beings who will choose and think the choice all important and be strong and healthy and wise in choosing, can we escape this dilemma."

Science News Letter, September 20, 1941

Democracy Based in Nature

"DEMOCRACY is the way of life that recognizes the right of every man to life, liberty and the pursuit of happiness," declared Prof. Max Schoen of the Carnegie Institute of Technology, Pittsburgh. "This is not a proclaimed right, but is rooted in the very nature of living beings in general, and of human beings in particular. Hence, no form of social organization that violates this right can have peace or permanence, for whatever obstructs liberty obstructs life, and life will either destroy whatever obstructs it or itself be destroyed."

Science News Letter, September 20, 1941

The percentage of fat in a *cow's milk* naturally varies at different seasons, and even from day to day, says a dairy specialist, but he adds that a cow will maintain a rather constant test level over a period of years.

Skunk pelts are more valuable the smaller the stripes are, and solid black pelts bring top prices.

THE HARVARD BOOKS ON ASTRONOMY

Edited by Harlow Shapley and Bart J. Bok

Now Ready

The Milky Way

By Bart J. Bok and Priscilla F. Bok
Harvard College Observatory

This book presents for the first time in semi-popular form the advances made in the exploration of the Milky Way. The dust and gas in the vast spaces between the stars, the compositions and dimensions of star clusters, the appearance of our galaxy to an observer in the Andromeda nebula, and the problems related to the past and future of our galaxy are discussed. Among the 96 illustrations are two large scale photographic maps of the Milky Way, recent photographs made with Schmidt cameras and portraits of the leading scientists in the field.

Contents: Presenting the Milky Way; How an Astronomer Attacks the Problems; The Sun's Nearest Neighbors; Reaching Out—The System Takes Shape; The Whirling Galaxy; Bright and Dark Nebulae; The Interstellar Gas; The General Haze; Men At Work; Explorations in Space; How Old is the Milky Way?

96 Illus. 204 Pages. $2.50

Between The Planets

By Fletcher G. Watson
Harvard College Observatory

This generously illustrated book summarizes our knowledge of comets, meteors, asteroids and meteorites. While it includes the latest discoveries about these bodies, it also considers the multitude of vexing problems yet unexplained. The interrelationships between the several varieties of bodies are stressed and the ways in which they might have been formed are discussed critically in relation to the formation of the planetary system.

Contents: Surveying the Solar System; The Little Planets; Whirling Fragments; Comets in Motion; Anatomy of a Comet; Shooting Stars; Meteor Showers; A Meteorite Falls; Meteorites in the Laboratory; Betwixt and Between.

106 Illus. 222 Pages. $2.50

THE BLAKISTON COMPANY
Philadelphia

•First Glances at New Books

BIOGRAPHY—GENERAL SCIENCE

MODERN AMERICANS IN SCIENCE AND INVENTION—Edna Yost—*Stokes,* 270 p., $2. Popular biographies of Ezra Cornell, John Francis Appleby, Stephen Smith, Samuel F. Langley, John Brashear, Ambrose Swasey, William Crawford Gorgas, Harvey Washington Wiley, Elmer A. Sperry, George Washington Carver, Leo Hendrik Baekeland, Willis H. Carrier, Charles F. Kettering, Frederick G. Cottrell, Robert R. Williams, Vladimir K. Zworykin, and Emil Truog.

Science News Letter, September 20, 1941

GENERAL SCIENCE

THE ROCKEFELLER FOUNDATION, Annual Report 1940—*Rockefeller Foundation, 49 West 49th St., New York City,* 473 p., illus. *Free upon direct application to the Rockefeller Foundation.* The periodic account to the world for many and widespread activities of this great institution. Almost every corner of the globe and every field of intellectual endeavor, in a very broad sense of the word, are affected by the carefully planned and executed operations which make the dollars bestowed produce mightily. President Raymond B. Fosdick's review is especially valuable because of its broad outlook upon world affairs.

Science News Letter, September 20, 1941

NATURAL HISTORY

HOW MIRACLES ABOUND—Bertha Stevens—*John Day,* 200 p., illus., $2.50. This book is intended for reading by parents and teachers, but children of seven or eight or nine and older will benefit indirectly. In a sense each chapter is first-aid to grown-ups who have to answer the many question marks that children spread over the face of the world. The information is poetically and competently expressed, with suggestions for more detailed books to be used while teaching or informing the child, and sources of simple science materials. The illustrations maintain the quality and atmosphere of the text.

Science News Letter, September 20, 1941

POLITICAL SCIENCE

OUR FEDERAL GOVERNMENT AND HOW IT FUNCTIONS—Writers' Program, Work Projects Administration, District of Columbia—*Hastings House,* 272 p., $2.50. The "Government" is dissected department by department, with brief but clear and accurate exposition of how each works. The seemingly innumerable commissions, boards, etc., that make up the bewildering "alphabet soup" are explained one by one, as well as semi- and quasi-governmental organizations like the National Academy of Sciences and the Federal Reserve System.

Science News Letter, September 20, 1941

ANATOMY-PHYSIOLOGY

HUMAN ANATOMY AND PHYSIOLOGY — Nellie D. Millard and Barry G. King—*Saunders,* 525 p., illus., $3. A text book for nurses.

Science News Letter, September 20, 1941

CHEMISTRY

GENERAL CHEMISTRY (4th ed.)—Harry N. Holmes—*Macmillan,* 720 p., $3.75. The fourth edition of this work is considerably larger in format, more popular in style, and more attractive in appearance than the third edition, which appeared only five years ago. The text has been brought up to the minute especially in the sections on petroleum refining, synthetic rubber, synthetic textiles (including "Nylon"), beryllium, and the alloy steels. A short chapter has been added on "Strategic Raw Materials".

Science News Letter, September 20, 1941

BIOLOGY—GEOLOGY

UNIVERSITY OF COLORADO STUDIES, Series D. Physical and Biological Sciences, Vol. 1, No. 3—*University of Colorado,* 100 p., $1.

Science News Letter, September 20, 1941

PHOTOGRAPHY

PHOTOGRAPHIC EMULSION TECHNIQUE —T. Thorne Baker—*Amer. Photographic Pub. Co.,* 263 p., illus., $4. This book gives complete information on the making of photographic emulsions from the time of Daguerre down to the super-speed films of today. The author's 35 years' experience in the field qualify him for the task.

Science News Letter, September 20, 1941

LANGUAGE

PHONETICS, An Introduction to the Principles of Phonetic Science from the Point of View of English Speech—Claude E. Kantner and Robert West—*Harper,* 418 p., illus., $3.50. The title carries its own thumbnail description of this text, but it may be added that the book emphasizes fundamentals, devotes great care to oral geography, and the authors are two well-known university professors of speech. The book is intended for college classes in phonetics and for teachers.

Science News Letter, September 20, 1941

MILITARY SCIENCE

PLANNED A. R. P. (First American ed.)—Tecton, Architects—*Chemical Pub. Co.,* 138 p., illus., $2.50. Air-raid protection for the entire population of a city is planned out in this British book. Large shelters, air conditioning, electric lighting, decontamination chambers, etc., and the protective value of various types of shelters, are discussed.

Science News Letter, September 20, 1941

GEOGRAPHY

MICHIGAN, A Guide to the Wolverine State — Compiled by workers of the Work Projects Administration in the State of Michigan—*Oxford Univ. Press,* 682 p., illus., $3. Michigan, with its industries, sports, touring possibilities, and the rest of its personality, makes one of the bulkier volumes in the WPA series of guide books on the states. These often praised books maintain a high standard, providing as they do informative and readable reference data on what each state is really like.

Science News Letter, September 20, 1941

PHYSICS

MUSICAL ACOUSTICS—Charles A. Culver—*Blakiston,* 194 p., illus., $2.50. This work is designed to give musicians a knowledge of the fundamental laws of acoustics which are the basis of their art. It explains the operation of musical instruments, the mechanism of hearing, and the acoustics of rooms.

Science News Letter, September 20, 1941

MATHEMATICS

THE ELEMENTS OF STATISTICS—Elmer B. Mode—*Prentice-Hall,* 378 p., $3.50. All the operations concerned in the reading, representation, and interpretation of statistics are simply explained in this book, such as index numbers, frequency curves, average and median values, curve fitting, correlation, measures of reliability, etc. No mathematics beyond secondary school geometry and algebra is required at the start, but the reader is later instructed in the use of logarithms, the slide rule, and the method of least squares.

Science News Letter, September 20, 1941

MEDICINE

VISION, A Study of Its Basis—S. Howard Bartley—*Van Nostrand,* 350 p., $3.50. A handbook for scientists and students representing the physiological phase in the study of vision.

Science News Letter, September 20, 1941